AMENDMENTS

1. (currently amended) A system for scan converting ultrasound data from an ~~two-dimensional~~ acquisition format comprising a polar format to a two-dimensional display format comprising a Cartesian format, the system comprising:

a look-up table having values corresponding to a spatial conversion from Cartesian coordinates of the Cartesian format~~the two-dimensional display format to~~ to polar coordinates of the polar ~~the two-dimensional acquisition~~ format; and

a processor ~~operable~~configured to identify acquired ultrasound data corresponding to the polar coordinates as a function of the values, the polar coordinates identified as a function of the values using the look-up table for the spatial conversion from the Cartesian coordinates associated with a virtual volume free of voxel data, ~~and~~ the processor operable to interpolate, in the polar format, ~~display values~~ from the identified acquired ultrasound data, the interpolation being a function of three-dimensional rendering rays cast through the virtual volume, wherein the processor is ~~operable~~ configured to avoid scan-conversion from the polar coordinates of volume data that does not contribute to a final volume rendered image by scan converting only visible voxels based on the rendering rays through the virtual volume and corresponding Cartesian coordinates, the identifying corresponding to identifying ~~for display format~~Cartesian coordinates associated with visible voxels of the final volume rendered image.

2. (currently amended) The system of Claim 1 wherein the values comprise the [[P]]polar coordinates, the look-up table entries indexed by integer Cartesian coordinates and wherein the processor is operable to bilinearly interpolate from the look-up table values using fractional offsets of the Cartesian coordinates.

3. (original) The system of Claim 1 wherein the processor is operable to determine display coordinates of interest and identify the acquired ultrasound data by inputting the display coordinates of interest into the look-up table.

4. (currently amended) The system of Claim 3 wherein the acquired ultrasound data represents a scan volume in the acquisition format, wherein the processor is operable to determine display coordinates for a plane through the volume as the display coordinates of interest;

further comprising a display operable to display a two-dimensional image representing the plane in the display format with the ~~display~~interpolated values.

5. (currently amended) The system of Claim 3 wherein the acquired ultrasound data represents a scan volume in the acquisition format, wherein the processor is operable to determine display coordinates for ~~a plurality of~~the rays through the virtual volume as the display coordinates of interest;

further comprising a display operable to display a two-dimensional image of a Volume Rendering of at least a portion of the scan volume in the display format with the ~~display~~ interpolated values.

6. (currently amended) The system of Claim 5 wherein each of the ~~display~~ interpolated values is a function of an alpha blending of a plurality of acquired ultrasound data values and wherein the processor is operable to limit a number of acquired ultrasound data values blended as a function of a threshold such that scan conversion of other acquired ultrasound data values is avoided.

7. (currently amended) The system of Claim 1 further comprising an RGBA look-up table addressed by the ~~display~~ interpolated values, the RGBA look-up table operable to output an RGBA value corresponding to the display value.

8. (original) The system of Claim 1 wherein the acquired ultrasound data comprises data associated with acquisition by a wobbler transducer array, wherein the values of the look-up table include corrections for shear distortion.

9. (original) The system of Claim 1 wherein the look-up table values correspond to the spatial conversion from the display format to the acquisition format for at least one acquisition plane;

further comprising an additional look-up table corresponding to spatial conversion from the display format to the acquisition format across multiple acquisition planes.

10. (previously presented) A system for scan converting ultrasound data from an acquisition format to a display format, the system comprising:

a look-up table having values corresponding to a spatial conversion from the display format to the acquisition format; and

a processor operable to identify acquired ultrasound data as a function of the values and operable to interpolate display values from the identified acquired ultrasound data;

wherein the acquired ultrasound data represents a plurality of scan planes, the acquired ultrasound data of each scan plane in a Cartesian coordinate format, each of the scan planes positioned in the volume in a Polar coordinate format, where the look-up table values correspond to the spatial conversion from the Cartesian coordinate format to the Polar coordinate format relative to the scan plane positions in the volume.

11. (original) The system of Claim 1 wherein the processor comprises a graphics processing unit.

12. (original) The system of Claim 1 wherein the look-up table values each comprise a set of two fixed-point values, one Boolean Flag, and one Integer Sum, the two fixed-point values being Polar coordinates.

13. (original) The system of claim 12 wherein the Boolean Flag indicates whether the set corresponds to a location outside of scanned region.

14. (currently amended) A method for scan conversion of ultrasound data from an acquisition format to a display format, the method comprising:

(a) identifying acquisition format coordinates with display format coordinates indexed to a look-up table of a memory;

(b) interpolating, by a processor, acquisition format coordinates stored in the look-up table; and

(c) interpolating display values from acquired ultrasound data in the acquisition format and representing a patient, the interpolating of the display values being ~~and~~ based on the acquisition format coordinates determined in (b);

wherein (a), (b), and (c) comprise avoiding scan-conversion of ~~volume~~the acquired ultrasound data that does not contribute to a final volume rendered image, the identifying of (a) corresponding to identifying for the display format coordinates associated with visible voxels of the final volume rendered image, the visible voxels determined from rays for three-dimensional rendering through a virtual volume free of voxel data and corresponding Cartesian coordinates, the Cartesian coordinates of the visible voxels being the display format coordinates used for the look-up table.

15. (original) The method of Claim 14 wherein (a) comprises:

(a1) inputting Cartesian coordinates into the look-up table; and

(a2) outputting Polar coordinates interpolated from the look-up table in response to (a1).

16. (cancelled)

17. (currently amended) The method of Claim [[16]]14 wherein the acquired ultrasound data represents a scan volume in the acquisition format;

wherein (d) comprises determining display coordinates for a plane through the scan volume as the display coordinates of interest; and

further comprising:

(e) displaying a two-dimensional MPR image representing the plane in the display format as a function of the display values.

18. (currently amended) The method of Claim [[16]]14 wherein the acquired ultrasound data represents a volume in the acquisition format;

wherein (d) comprises determining display coordinates for a plurality of rays through the volume as the display coordinates of interest; and

further comprising:

(e) displaying a two-dimensional Volume Rendering of at least a portion of the scan volume in the display format as a function of the display values.

19. (currently amended) The method of Claim 18 wherein (e) comprises alpha blending a plurality of the acquired ultrasound data values for each of the display values; and

further comprising:

(f) limiting a number of acquired ultrasound data values blended in (e) as a function of a threshold; and

(g) avoiding scan conversion of a plurality of acquired ultrasound data based on (f).

20. (original) The method of Claim 14 further comprising:

(d) inputting the display values into an RGBA look-up table; and

(e) outputting RGBA values corresponding to the display values in response to (d).

21. (original) The method of Claim 14 further comprising:

(d) acquiring the acquired ultrasound data with a wobbler transducer array;

wherein (a) comprises correcting for shear associated with (d) as a function of the values of the look-up table.

22. (original) The method of Claim 14 wherein (a) comprises determining a spatial conversion from the display format to the acquisition format for at least one acquisition plane;

further comprising:

(d) spatially converting from the display format to the acquisition format across multiple acquisition planes with an additional look-up table.

23. (currently amended) A method for scan conversion of ultrasound data from an acquisition format to a display format, the method comprising:

(a) identifying acquisition format coordinates with display format coordinates indexed to a look-up table of a memory;

(b) interpolating acquisition format coordinates stored in the look-up table; and

(c) interpolating, by a processor, display values of an image from acquired ultrasound data representing a patient and based on the acquisition format coordinates determined in (b);

wherein the acquired ultrasound data represents a plurality of scan planes with the acquired ultrasound data of each scan plane in a Cartesian coordinate format and each of the scan planes positioned in the volume in a Polar coordinate format, wherein (a) comprises spatially converting from the Cartesian coordinate format to the Polar coordinate format relative to the scan plane positions in the volume.

24. (original) The method of Claim 14 further comprising:

(d) generating the look-up table as a function of a spatial relationship of a display format with user configured acquisition parameters.

25. (original) The method of Claim 14 further comprising:

(d) identifying whether the acquisition format coordinates are outside of scanned region with the look-up table.

26. (original) The method of Claim 24 wherein (d) comprises generating a two-dimensional look-up table with acquisition format coordinates for each coordinate of a Cartesian volume.

27. (original) The method of Claim 14 further comprising:

(d) volume rendering as a function of the display values as a function of time.

28. (new) A system for combined scan conversion and volume rendering of ultrasound data, the system comprising:

a look-up table having values corresponding to a spatial conversion from Cartesian coordinates of the Cartesian format to polar coordinates of the polar format; and

a processor configured to transform spatial coordinates of samples in a virtual Cartesian volume to spatial coordinates in the polar format using the look-up table during volume rendering such that scan conversion from the polar coordinates to an image occurs during volume rendering without separate scan conversion and then rendering, the processor configured to selectively determine, during the volume rendering, the spatial coordinates of the virtual Cartesian volume that are visible in order to avoid scan-conversion computations of acquired ultrasound data associated with polar coordinates for non-visible locations, only the acquired ultrasound data associated with the spatial coordinates of the virtual Cartesian volume that are visible contributing to a given view of the volume being scan converted, the determination of visibility being a function of rays passing through the virtual Cartesian volume from an observer location, the processor configured, due to the avoidance and using the look-up table, to scan convert different acquired ultrasound data for different observer locations relative the virtual Cartesian volume, the virtual Cartesian volume being free of voxel values.

29. (new) A method for combined scan conversion and volume rendering of ultrasound data, the method comprising:

casting, with a processor, rays through a virtual volume comprising locations free of voxel data;

determining, with the processor, locations of the virtual volume contributing to pixels of an image to be rendered and locations of the virtual volume not contributing to pixels of an image to be rendered;

converting first coordinates of the locations contributing to pixels of the image to be rendered to polar coordinates of a scan volume of acquired ultrasound data in the polar format and not converting the first coordinates of the locations not contributing;

interpolating the acquired ultrasound data in the polar format and corresponding to the polar coordinates to pixel locations for the image to be rendered; and

rendering the image by displaying the interpolated acquired ultrasound data for the pixel locations;

wherein interpolating of the acquired ultrasound data from the polar format is avoided by determining the location of the virtual volume not contributing and not converting first coordinates of the locations not contributing such that the image is rendered without determining voxel data for a Cartesian volume corresponding to the virtual volume.